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CALIFORNIA, 2000**

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Gary L. Ivey and Caroline P. Herziger  
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# **DISTRIBUTION OF GREATER SANDHILL CRANE PAIRS IN CALIFORNIA, 2000.**

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## **ABSTRACT**

We conducted an extensive survey of breeding greater sandhill cranes (*Grus canadensis tabida*) in California in 2000. A total of 465 pairs was recorded at 127 sites, an increase of 68% from the last statewide survey in 1988; however, numbers at some sites decreased. The greatest number was in Modoc County with 252 (54%), followed by Lassen County with 122 (26%), Siskiyou County with 51 (11%), Plumas County with 20 (4%), and Shasta and Sierra counties with 10 (2%) each. Sixty-three percent of the crane pairs were noted on private lands, with 37% on federal and state lands.

## **INTRODUCTION**

Sandhill cranes which breed in California belong to the Central Valley Population (CVP), which is defined as the greater sandhill cranes which winter in the Central Valley of California. The species has been listed as Threatened in the state since 1983. Previous surveys of California's breeding crane pairs were conducted in 1988 (Littlefield 1989, Littlefield et al. 1994), 1981 (Littlefield 1982), and in the early 1970s (Littlefield and Thompson 1979). This report documents the results of a similar study in 2000. The species' distribution lies in the northeastern portion of the state in Modoc, Lassen, Siskiyou, Plumas, Shasta, and Sierra counties. Also within the CVP's range are an estimated 1,151 pairs in Oregon (Ivey and Herziger 2000), 19 in southern Washington (Engler and Brady 2000), at least 11 in western Nevada (Pacific Flyway Council 1997, T. Floyd and L. Neel, personal communications, G. Ivey, personal observation), and an unknown number in British Columbia.

Our objectives were to map the distribution of territorial pairs, to obtain an estimate of the breeding population in the state, and to determine trends by comparing current data with the previous surveys. In 1988, 276 pairs were documented, while 191 and 122 pairs were reported in 1981 and the early 1970s, respectively. Statewide surveys are listed as a priority for the CVP in the Pacific Flyway Plan (Pacific Flyway Council 1997).

## **METHODS**

*Fieldwork:* Fieldwork was conducted primarily from 2 April to 1 June. Sites selected to be surveyed were based on a list compiled from Littlefield et al. (1994), areas with historic or recent crane sightings provided by agency personnel, and a recent survey conducted near Likely in

Modoc County (Roberts et al. 1996). We also checked locations which appeared suitable on maps and potential habitat encountered incidentally; these sites supported several new pairs. Pair territories were located on lands administered by the U.S. Forest Service (USFS), California Department of Fish and Game (CDFG), U.S. Fish and Wildlife Service (USFWS), and Bureau of Land Management (BLM), as well as those in private ownership. A majority of the pairs were observed by the authors from the ground using binoculars and spotting scopes to minimize disturbance to the birds, with many sites checked two or more times to provide adequate coverage. Over 13,000 miles were driven and many miles hiked while conducting the study. Additional pairs were recorded by agency biologists and on an aerial survey on 23 May to cover areas where access was difficult. All pairs were mapped by township and section, and data for each site was compiled in Appendix 2 (a separate report).

*Interpreting Data:* Cranes on nests, pairs with unfledged colts, and pairs and singles found on historic sites were classified as pairs. Where new birds were noted, we re-visited the site to confirm that they were on territory. Singles and pairs not behaving territorially or observed only once at a non-historic area were not counted as a pair.

Flocks were also recorded during the survey. When groups were noted on multiple occasions in the same area, the greater number was included in this report to avoid counting some birds more than once.

Land ownership was recorded where crane pairs were found. To calculate numbers and percentages of sites by ownership, individual pair territories with joint ownership were grouped by agency (e.g., Private/USFS territories were considered USFS).

## RESULTS

*Breeding Pairs:* We found 465 territorial sandhill crane pairs at 127 sites in six counties (Appendix 1). In all, 190 sites were surveyed. Habitats ranged from typical wet meadows and irrigated pastures to small ponds and lakes with little or no meadow. Most nests were observed in conventional marsh or meadow vegetation, although several were noted on artificial islands with sparse cover, including one within a cattle feedlot pond. Figure 1 shows the locations of the sites where pairs were located. Additional pairs undoubtedly exist within the current breeding range of the species; we received reports of a few recent sightings too late to confirm that these were breeding pairs in 2000.

The greatest number of pairs was found in Modoc County with 252 (54%), followed by Lassen County with 122 (26%), Siskiyou County with 51 (11%), Plumas County with 20 (4%), and Shasta and Sierra counties with 10 (2%) each. The largest concentrations were at Surprise Valley (primarily in Modoc County) with 14% of the total (66 pairs), followed by Ash Creek Wildlife Area (WA) (43) and Big Valley (34) in Lassen and Modoc counties, and Modoc National Wildlife Refuge (NWR) (32) in Modoc County. In addition, there were five sites which were of secondary importance, hosting more than 10 pairs: Ash Valley (13) in Lassen County; and Likely (22), Goose Lake (17), Alturas (13), and Canby (11) in Modoc County.

A majority of the pairs were located on private lands (63%) (Table 1). Of the 69 on USFS lands, 35 were on Modoc National Forest (NF) and 26 on Lassen NF, followed by Klamath and Tahoe NFs with three each, and Plumas and Shasta NFs with one each. On CDFG land, 57 pairs were divided among the following WAs: Ash Creek (43), Butte Valley and Willow Creek (4 each), and Honey Lake and Shasta Valley (3 each). USFWS pairs numbered 41, and were primarily located at Modoc NWR (32), followed by Lower Klamath NWR (8), and Tule Lake NWR (1). All five BLM pairs were on the Alturas District.

Table 1. Land ownership of greater sandhill crane pairs in California, 2000.

Land ownership	# pairs	% total pairs
Private	293	63
U.S. Forest Service	69	15
California Department of Fish and Game	57	12
U.S. Fish and Wildlife Service	41	9
Bureau of Land Management	5	1
<b>TOTAL</b>	<b>465</b>	<b>100</b>

*Flocks:* A total of 351 flocked birds at 20 sites was recorded during the survey, but estimating the number of nonbreeding subadults within these groups was not possible. We could assume these were all nonbreeders, however, flocks undoubtedly contained some migrating pairs early in the season when many pair territories were still dry or frozen. In addition, sizes fluctuated with date and time of day. For example, at Ash Creek WA groups were present every day surveyed, and numbers varied extensively. In March as many as 5,000 greater sandhill cranes were recorded (W. Epperson, personal communication), but these were considered primarily migrants and were not included in the total. The largest concentrations were found at Big Valley (114) and Ash Creek WA (90) in Lassen and Modoc counties, followed by Mountain Meadows (25), Honey Lake WA (16), and Pine Creek Valley (13) in Lassen County; Canby and Surprise Valley (12 each) in Modoc County; and Butte Valley WA (24) and Lower Klamath NWR (17) in Siskiyou County.

## DISCUSSION

*Breeding Pairs:* Based on our findings, there are 189 (68%) more crane pairs in the state than in 1988 when 276 pairs were documented. The reasons for the increase are uncertain, but are likely due to several factors. For example, the 1988 survey was conducted during a drought year which may have resulted in some unoccupied territories. Generally favorable water conditions have existed in the region since 1993, and have probably contributed to increased crane productivity. The higher number is also due in part to improved monitoring by agency biologists, especially on the Lassen and Modoc NFs; in part, by exploring potential habitat and sites suggested by agency personnel, we recorded 88 pairs at 72 new sites which were not surveyed or where no pairs were found in 1988 (Table 2). This number includes 47 pairs at 43 new sites on USFS lands compiled from USFS observations as well as our confirmation of their recent sightings as territorial pairs.

Local biologists also helped identify pairs on private lands. For example, Shasta Valley WA staff surveyed a portion of Siskiyou County which increased by 13 pairs, and Modoc NF provided sightings and identified potential habitat for Alturas and Canby, resulting in a doubling of the combined total of these areas. In addition, most of the increase at Likely can be attributed to re-sightings of nesting pairs recorded from helicopter flights reported by Roberts et al. (1996).

Table 2. Summary of 88 greater sandhill crane pairs found at 72 new sites in California, 2000.

Site Name	# pairs	Site Name	# pairs	Site Name	# pairs
<b>Lassen County (28)</b>		Bucher Swamp	1	Whitney Reserv.	2
Ashurst Well	1	Chimney Rock	1	Widow Valley	1
Bear Valley Reserv.	1	Dry Valley Reserv.	1	Wilson Valley	1
Beaver Creek Wetlands	1	Duncan Pond	1	<b>Plumas County (4)</b>	
Blue Door Flat	1	Emigrant Springs	1	Little Summit Lake	1
Champ's Flat	1	Enquist Reserv.	1	Quincy	1
Clover Flat	1	Everly Reserv.	1	Red Clover Valley	1
Gordon Lake	1	Fisher Ranch	1	Willow Lake	1
Hall's Flat	1	Joiner Reserv.	1	<b>Shasta County (4)</b>	
Herlong	2	Kramer Reserv.	1	Cassel	2
Honey Lake Valley	5	Little Egg Lake	1	Hopeless Flat	1
Little Round Valley	1	Little Grizzly Spring	2	Summit Lake	1
Long Lake	1	Little Juniper Reserv.	3	<b>Sierra County (5)</b>	
McCoy Flat	1	McKay Flat	1	Campbell Hot Springs	1
Mosquito Flat	1	Mowitz Creek	1	Knuthson Meadow	1
Mountain Meadows	2	Pease Flat	1	Kyburz Flat	2
North Myer Flat Reserv.	1	Pinky's Pond	1	Webber Lake	1
Poison Lake	1	Pond 139	1	<b>Siskiyou County (10)</b>	
Schroder Lake	1	Reservoir N	1	Barnum Flat	1
Section 3 Wetland	1	Rock Creek	2	Butte Valley Nat. Grassl.	1
Squaw Valley	1	Round Valley Reserv.	1	Dry Lake	1
Summit Lake	1	Six Shooter Flat	1	Hoffman Mill Meadow	1
Susanville	1	Spaulding Reserv.	1	Scott Valley	1
<b>Modoc County (37)</b>		Taylor Wetlands	1	Shasta Valley South	3
A-1 Pond	1	Upper Cummings	1	Wiley Wetlands	1
Baseball Reserv.	2	Walter Flat	1	Willow Creek Ranch	1

The increasing trend of pair numbers can also be attributed to management practices and changes in land use. Modoc NWR, in particular, has been a source of new crane pairs as the refuge has maintained an average recruitment rate of 20.5% (range 9-34%) from 1979-1998 (USFWS unpublished data). The USFS has increased the amount of suitable crane habitat through their wetlands program, and has also dedicated more management attention toward the species. State WAs pairs grew as well; habitat is managed for wildlife with some emphasis on cranes, including water and vegetation manipulation. Private lands have also added to the greater pair numbers. A historic shift from small grain farming to irrigated pasture occurred in much of this region from the 1950s-1960s as grain prices dropped, resulting in more flood-irrigated meadows (R. Smith, personal communication), and cranes have likely responded to these improved habitat conditions. This increase in available habitat has perhaps mitigated some of the historic losses of floodplain wetlands. Coyote control routinely practiced on private lands has also probably contributed to

the expansion of the population.

Decreases in pairs at historic sites may be due to mortality of one or both members of the pair or shifting of pairs to new sites. Declines are also likely due to several habitat factors. For example, Ash Valley, Clarke's Valley, Dixie Valley, and Red Rock Lakes in Lassen County, and Red Rock Lakes in Siskiyou County (all sites on private lands with fewer or no pairs) appeared dry; numbers may have declined due to draining or late irrigation practices which are unfavorable to nesting cranes. Pivot irrigation has replaced flood-irrigated meadows at Susan Valley Ranch in Lassen County, site of a pair in 1988. Other threats included human disturbance. At one Lassen County site no cranes were found where they had nested the year before, but a woodcutter was working nearby, likely causing the pair to abandon its territory (J. Rechten, personal communication).

Changes of sandhill crane pairs by county compared to the 1988 survey were as follows: Modoc County still supported a majority (54%), although slightly down from the 59% recorded in 1988. Lassen County decreased slightly from 27 to 26%, Siskiyou County remained at 11%, Plumas County increased from three to four percent, and Shasta and Sierra counties each increased from less than one percent to two percent.

As in 1988, the percentage of pairs on private lands remained high at 63%, a slight decrease from the 67% recorded in 1988. USFWS ownership decreased from 15 to 9%, CDFG decreased from 13 to 12%, USFS increased from 5 to 15%, and BLM increased from zero to one percent.

The most notable changes in numbers of pairs from sites also surveyed in 1988 included greater numbers at Ash Creek WA (from 30 to 43) and Big Valley (from 2 to 34, including 1988 Pit Valley site) in Lassen in Modoc counties, and Likely (from 12 to 22) and Surprise Valley (from 56 to 66) in Modoc County. Other increases of note were documented at Pine Creek Valley (from 1 to 5) in Lassen County; Alturas (from 7 to 13) and Canby (from 5 to 11) in Modoc County; Indian Valley (from 1 to 9) in Plumas County; Sierra Valley (from 6 to 10) in Plumas and Sierra counties; and Big Springs (from 1 to 4) and Butte Valley WA (from 1 to 4) in Siskiyou County. Additionally, we found 88 pairs at new sites.

Pair number decreases of note were recorded at Ash Valley (from 17 to 13 pairs), Dixie Valley (from 3 to 0), Honey Lake WA (from 5 to 3), and Red Rock Lakes (from 3 to 1) in Lassen County; and Lower Klamath NWR (from 10 to 8) in Siskiyou County. It should be noted that lower numbers of pairs at Honey Lake WA and Lower Klamath NWR were in conjunction with increased numbers on nearby private lands and may represent dispersal. In addition, no pairs were recorded at seven sites where single pairs were noted in 1988: Clarke's Valley and Susan Valley Ranch in Lassen County; Davis Creek, Ingall Swamp, and Steele Swamp in Modoc County; Fort Crook in Shasta County; and Red Rock Lakes in Siskiyou County.

Comparisons can also be made for selected sites which were surveyed in 1971 and 1981 as well as 1988, as reported in Littlefield et al. (1994) (Table 3). A majority of the sites have supported increased pair numbers over time, particularly Big Valley (including Ash Creek WA), Canby, Egg Lake, Goose Lake, Modoc NWR, and Surprise Valley. Some sites have shown a fluctuation of numbers, including Ash Valley, Honey Lake WA, Likely, and Lower Klamath NWR. For

these comparable sites, there was an increase of 56 pairs (31%) between the 1981 and 1988 surveys, and 77 (33%) between 1988 and 2000.

*Flocks:* The number of flocked birds increased from 159 to 351 compared to 1988, but numbers can be variable, as previously discussed. Sites where flocks were found this year but not in 1988 included: Mountain Meadows and Pine Creek Valley in Lassen County, Canby in Modoc County, and Butte Valley WA in Siskiyou County. Five of the sites from 1988 continued to be used by flocks: Ash Creek WA/Big Valley (from 6 to 204) in Lassen and Modoc counties, Honey Lake WA (from 5 to 16) in Lassen County, Surprise Valley (from 35 to 12) in Modoc County, and Grass Lake (from 19 to 9) and Lower Klamath NWR (from 5 to 17) in Siskiyou County. Ash Valley, Davis Creek, and Likely did not support flocks as in 1988.



Table 3. Comparisons of greater sandhill crane pairs at selected sites in California in 1971, 1981, 1988 (from Littlefield et al. 1994), and 2000.

Site	1971	1981	1988	2000
Lassen County				
Big Valley (includes Ash Creek WA) <sup>1</sup>	21	24	32	77
Honey Lake WA	3	6	5	3
Madeline	1	1	2	2
Modoc County				
Surprise Valley (1 pair in Lassen Co.)	42	44	56	66
Modoc NWR	16	21	30	32
Likely	14	9	12	22
Jess Valley	7	7	9	8
Goose Lake	2	7	15	17
Canby	2	6	5	11
Round Valley	2	2	0	0
Shasta County				
Fall River Valley	2	2	4	6
SUB-TOTAL	112	129	170	244
Lassen County				
Ash Valley	—	13	17	13
Willow Creek Valley	—	7	6	9
Horse Lake	—	2	1	1
Red Rock Lakes	—	2	3	1
Ashurst Lake	—	1	1	1
Dixie Valley	—	1	3	0
Eagle Lake	—	1	0	0
Grasshopper Valley	—	1	1	1
Pine Creek Valley	—	1	1	5
Modoc County				
Egg Lake	—	2	4	6
Cow Head Valley	—	0	1	
	2			
Hager Basin	—	1	1	2
Ingall Swamp	—	0	1	0
Steele Swamp	—	1	1	0
Weed Valley	—	1	1	1
Plumas County				
Sierra Valley <sup>2</sup>	—	6	6	10
Siskiyou County				
Lower Klamath NWR	—	6	10	8
Grass Lake	—	2	5	6
Tule Lake NWR	—	1	1	1
TOTAL	NA	178	234	311

<sup>1</sup> Includes portion in Modoc County. <sup>2</sup> Includes portion in Sierra County.

## MANAGEMENT CONSIDERATIONS

Changes in agricultural practices are likely a greater threat to the future of breeding cranes than those in land use. Because cranes are dependent on wetlands, they are vulnerable to alterations in hydrology. Most pairs depend on habitats maintained by flood-irrigation, and shifts in the timing and application of water could negatively impact breeding cranes. Irrigation dates for wetlands and fields are important as water should be on territories by early April to initiate nesting, and drying before August can lead to increased chick mortality from predation and starvation. Draining and late irrigation initiation dates may have resulted in fewer or no pairs recorded at several historic sites in both California and Oregon.

Livestock management practices are another issue. Most lands supporting crane pairs are grazed, and birds at these sites could be adversely effected by unfavorable management decisions such as high cattle stocking densities during the breeding season. For example, at Surprise Valley in May 1988, one pair was known to have immediately abandoned its nest when cattle entered the nesting marsh (Littlefield 1989). Also in northeastern California in 1988, some pairs never attempted to nest in areas with summer livestock grazing. At Indian Valley in Plumas County in 2000, cattle were returned to irrigated pastures the first week of May (M. Williams, personal communication) which may have disrupted nesting cranes. Even if eggs successfully hatch there is the potential that chicks will be trampled by cattle, as has been observed in California and Idaho (Littlefield 1989).

On both private and public lands, habitat will be lost if water rights for important wetlands are diminished. For example, pairs in the Klamath Basin could be effected by changes in water rights which are currently under adjudication, leaving those cranes with an uncertain future (Ivey and Herziger 2000).

There is great potential to benefit sandhill cranes in California by implementing wetland restoration and enhancement. The needs of cranes should be integrated into watershed enhancement projects and wetland joint venture and other agency land management plans, and wetland projects should be designed to benefit cranes (e.g., about 1,000 acres of floodplain wetlands could be restored at Ash Creek WA). In addition, agency incentives should be developed to encourage private landowners to provide suitable habitat for cranes.

## CONCLUSION

Although the California segment of the CVP has grown since the 1988 survey, the majority of crane territories are not necessarily secure for the future as they are on private lands. Many of the state's crane pairs depend on flood-irrigated habitats; therefore, the timing of water application is critical. Loss of water rights for irrigation would eliminate habitat. Additionally, many sites are grazed by livestock and could be negatively effected by management practices such as high cattle stocking densities. With more than 60% of the sites under private ownership, the decisions of these landowners will greatly influence the future of sandhill cranes.

The productivity of CVP cranes should also be of concern. Data from Malheur NWR in Oregon, which supports the largest concentration of breeding crane pairs of the CVP, shows low productivity, averaging only 1.6% from 1995-1998 (G. Ivey, unpublished data). However, recent data from Modoc NWR indicates a rate of 20.5%. Although recruitment at Modoc NWR has been excellent, data on productivity at most California sites is very limited, and more comprehensive studies are needed to better assess the fitness of the population.

Finally, agencies should develop plans for conservation of sandhill cranes on public lands, and work collaboratively with private landowners to enhance conditions for cranes on both breeding and wintering grounds. Within their breeding range, restoration of riparian floodplains (e.g., Pitt River) would greatly improve habitat. On the wintering grounds in the Central Valley, agricultural lands traditionally used are being lost to urban expansion, as well as conversion to incompatible crops such as vineyards and orchards (Littlefield and Ivey 2000). Core roost and foraging sites need to be secured to help maintain the viability of the species in California.

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## APPENDIX 1

Number of sandhill crane pairs by county in California, 2000.

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<b>Lassen County (122):</b>	Big Valley (28), Ash Creek WA (24), Ash Valley (13), Willow Creek Valley (9), Honey Lake Valley (5), Pine Creek Valley (5), Honey Lake WA (3), Herlong (2), Madeline Plains (2), Mountain Meadows (2), Ashurst Lake (1), Ashurst Well (1), Bear Valley Reservoir (1), Beaver Creek Wetlands (1), Blue Door Flat (1), Bullard Lake (1), Champ's Flat (1), Clover Valley (1), Feather Lake (1), Gordon Lake (1), Grasshopper Valley (1), Gray's Valley (1), Hall's Flat (1), Horse Lake (1), Little Harvey Valley (1), Little Round Valley (1), Long Lake (1), McCoy Flat (1), Mosquito Flat (1), North Myer Flat Reservoir (1), Papoose Meadow (1), Poison Lake (1), Red Rock Lakes (1), Schroder Lake (1), Section 3 Wetland (1), Squaw Valley (1), Summit Lake (1), Surprise Valley (1), Susanville (1).
<b>Modoc County (252):</b>	Surprise Valley (65), Modoc NWR (32), Likely (22), Ash Creek WA (19), Goose Lake (17), Alturas (13), Canby (11), Jess Valley (8), Big Valley (6 including 1988 Pit Valley site), Egg Lake (6), Little Juniper Reservoir (3), Whitehorse Flat (3), Baseball Reservoir (2), Cow Head Valley (2), Hager Basin (2), Little Grizzly Spring (2), Rock Creek (2), Whitney Reservoir (2), A-1 Pond (1), Beeler Reservoir (1), Buchanan Flat (1), Bucher Flat (1), California Pines (1), Chimney Rock (1), Dry Valley Reservoir (1), Duncan Pond (1), Emigrant Springs (1), Enquist Reservoir (1), Everly Reservoir (1), Fairchild Swamp (1), Fisher Ranch (1), Hackamore Reservoir (1), Joiner Reservoir (1), Kramer Reservoir (1), Little Egg Lake (1), McKay Flat (1), Mowitz Creek (1), Pease Flat (1), Pinky's Pond (1), Pond 139 (1), Reservoir C (1), Reservoir N (1), Round Valley (1), Six Shooter Tank (1), Spaulding Reservoir #1 (1), Sworinger Reservoir (1), Taylor Wetlands (1), Upper Cummings (1), Walter Flat (1), Weed Valley (1), Widow Valley (1), Wildhorse Valley (1), Wilson Valley (1).
<b>Plumas County (20):</b>	Indian Valley (9), Sierra Valley (5), Chester (2), Little Summit Lake (1), Quincy (1), Red Clover Valley (1), Willow Lake (1).
<b>Shasta County (10):</b>	Fall River Valley (6), Cassel (2), Hopeless Flat (1), Summit Lake (1).
<b>Sierra County (10):</b>	Sierra Valley (5), Kyburz Flat (2), Campbell Hot Springs (1), Knuthson Meadow (1), Webber Lake (1).
<b>Siskiyou County (51):</b>	Lower Klamath NWR (8), Montague (8), Grass Lake (6), Big Springs (4), Butte Valley WA (4), Shasta Valley South (3), Shasta Valley WA (3), Grenada (2), Oklahoma Flat (2), Orr Lake (2), Barnum Flat (1), Butte Valley National Grassland (1), Dry Lake (1), Hoffman Mill Meadow (1), Prather Ranch (1), Scott Valley (1), Tule Lake NWR (1), Wiley Wetlands (1), Willow Creek Ranch (1).

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